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ABSTRACT

A study examined hourly earnings among Australian young people using three Youth in Transition cohorts from the Longitudinal Surveys of Australian Youth project (birth years 1961, 1965, and 1970). It considered correlations between hourly earnings and measures of social background and school factors, qualifications, and labor market history; modeled earnings using a four-step procedure adding social and demographic background factors, school factors including school sector and achievement, qualifications and year 12 completion, and employment history; and focused on aging and cohort effects by examining impact on hourly earnings of gender, schooling, qualifications, and employment experience at particular ages. Findings indicated that school achievement had a moderate effect on hourly earnings and its effects increased with age and over time; completing year 12 increased hourly earnings, an effect stronger on younger age groups; the gender gap in earnings declined across cohorts; employment experience had less impact among women, a difference greater in younger cohorts; living in a non-metropolitan area during school years was associated with lower hourly earnings; while having a degree was a major positive influence on earnings, other qualifications were of little long-term advantage; apprenticeship was associated with an initial earnings advantage that declined with age; and increases in overall unemployment were associated with decreases in hourly earnings. (Contain 17 references, 7 tables, and 8 figures.) (YLB)

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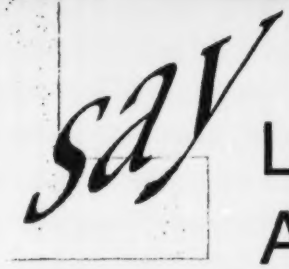

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Research Report Number 8

Youth Earnings in Australia 1980-1994:

A Comparison of Three Youth Cohorts

Gary N. Marks
Nicole Fleming

September 1998

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The *Longitudinal Surveys of Australian Youth* (LSAY) study the progress of several cohorts of young Australians between school, post-secondary education and training and work. The oldest cohort was born in 1961, while the youngest was a nationally representative sample of Year 9 students selected in 1998. The information from the surveys is used to provide a picture of what young Australians are doing and how this picture changes both as the cohort gets older and compared with other cohorts. More detailed investigations look at the links between social characteristics, education and training, and employment. Issues investigated in the LSAY project include school completion, participation in vocational and university education, part-time work, unemployment, earnings and school achievement. The project is commissioned by the Department of Employment, Education, Training and Youth Affairs (DEETYA).

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Research Report Number 8

YOUTH EARNINGS IN AUSTRALIA 1980-1994: A COMPARISON OF THREE YOUTH COHORTS

Gary N. Marks
Nicole Fleming

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EXECUTIVE SUMMARY

This report examines hourly earnings among Australian young people using three of the *Youth in Transition* cohorts from the *Longitudinal Surveys of Australian Youth* (LSAY) project. The influences on hourly earnings are analysed in three sections. The first presents the correlations between hourly earnings and measures of social background and school factors, qualifications and labour market history. The second part of the investigation models earnings using a four step procedure adding, sequentially, social and demographic background factors, school factors including school sector and school achievement, qualifications and year 12 completion, and finally employment history. The final section focuses on both aging and cohort effects by examining the impact on hourly earnings of gender, schooling, qualifications and employment experience at particular ages.

The main findings of this study are as follows:

- School achievement has a moderate effect on hourly earnings, net of qualifications and employment experience;
- The effects of school achievement increase with age;
- There is evidence that the effects of school achievement on hourly earnings are increasing over time;
- Completing year 12 increased hourly earnings, net of school achievement, other qualifications and background factors. Its effect was stronger at younger age groups;
- The gender gap in earnings appears to be declining across cohorts;
- Employment experience has less of an impact amongst women than it does amongst men; this difference is greater in younger cohorts;
- Background factors such as socioeconomic background and coming from a non-English speaking background do not have an effect net of qualifications and employment experience;
- Living in a non-metropolitan area during the school years is associated with lower hourly earnings;
- Having a degree is one of the major positive influences on earnings while other qualifications (excepting a University or CAE diploma) were of little long-term advantage;
- Apprenticeships are associated with an initial earnings advantage which declines as the youth cohorts grow older;
- Increases in the overall unemployment rate are associated with decreases in hourly earnings.

Youth Earnings in Australia 1980-1994: A Comparison of Three Youth Cohorts

INTRODUCTION

This report examines the earnings of young people in Australia using data from the *Longitudinal Surveys of Australian Youth* (LSAY) project. The main impetus for this report is to contribute to debates about the relationship between labour market outcomes of young people and achievement at school in literacy and numeracy. A major task of this report is to test if such relationships exist.

This report is relevant to other policy issues. It examines differences between social groups in earnings, one of the most prominent being the gender gap in income. Previous analyses of longitudinal data show that young men earn higher wages than young women. This result is especially striking since one of the major contributors to the gender gap are differences in labour force experience which, because of their limited time in the labour market, cannot explain the gender gap among young people. Over the last decade or so a major policy thrust has been to reduce the disadvantage women experience in the labour market. This report examines changes in the gender gap over time and points to the effectiveness of such policies.

This report is also relevant to another policy area, that is the Higher Education Contribution Scheme (HECS). One premise of HECS is that taxpayers with degrees earn higher salaries and therefore they should contribute to the cost of their education, which enabled them to earn higher incomes. This premise could be questioned if there was evidence that earnings increment to degrees was declining or that returns to other qualifications were comparable with those of a University degree. In most other data sets, the estimates of returns to qualifications are upwardly biased since they do not include ability measures. Here we estimate the returns to educational qualifications net of school achievement thereby substantially reducing this bias.

This report follows other LSAY reports which focus on labour market outcomes. LSAY Research Report No 4 focused on labour market outcomes at age 19, and LSAY Research Report No 7 focused on unemployment among wider age groups. Both investigated the effects of school achievement. This report looks at earnings up to 33 years of age.

This study addresses the following issues. .

1. What are the effects of school achievement as measured by tests of literacy and numeracy on earnings? The literature does suggest that achievement has effects independent of educational qualifications but there are few estimates of its effect in Australia. Furthermore, does the effect of achievement on earnings increase with age or labour market experience and has the magnitude of the effect changed over time?

2. The second area we examine is educational qualifications. We investigate the returns to educational qualifications net of achievement, the relative returns to different sorts of qualifications and whether the returns to education change over time both within and between cohorts.

3. Previous studies suggest that employment experience is an important independent influence on earnings. The effect of employment experience includes several distinct processes such as seniority, age and wage inflation. This study estimates the direct effect of labour market experience, net of age and wage inflation.

4. We examine changes in the size of the gender gap in earnings controlling for differences in educational qualifications and employment experience. Also, the study investigates differences between men and women in the returns to educational qualifications and experience.

5. An important area of debate is the relationship between youth wages and unemployment. Although we cannot model the effect of wages on unemployment, we can investigate the association between overall unemployment rates and youth earnings. One hypothesis is that there is a negative relationship: higher unemployment rates dampen youth wages. The alternative hypothesis is that there is no relationship. Since these data were collected over an extensive time period, these hypotheses can be investigated.

6. We model earnings attainment sequentially so we can estimate both the total effects of social background and school variables (including school sector), and the direct effects when controlling for educational qualifications and labour force experience.

The presentation and discussion of the analyses are organised into three sections. The first presents and discusses the correlations between hourly earnings with social background and school factors, qualifications and labour market experience. The second section discusses the results obtained from multivariate analyses, which model these influences with age and overall unemployment rates. The third section examines the impact on earnings of gender, educational qualifications and labour force experience at the same ages in different cohorts.

INFLUENCES ON EARNINGS - LITERATURE REVIEW

The dominant approach to earnings attainment is human capital theory developed by Becker (1975). In simple terms, human capital theory is based on the idea that individuals make investments in their education and training and are rewarded at a later date by higher incomes. Individuals defer present income and invest in increasing their productive capacities and, according to neo-classical economics, their wages will move to a level in accordance with their marginal productivity. This theory raises questions about whether individuals consciously make a decision to defer immediate gratification for future rewards, whether more educated workers are indeed more productive, and whether wages reflect productivity.

Education and training are important aspects of earnings for several other reasons. For many professional and increasingly managerial occupation, qualifications are mandatory as society becomes increasingly credentialised, with specific qualifications leading to specific jobs. Workers with particular skills generally have a higher market value, and either collectively or individually demand higher wages. Awards include specific qualifications in determining wage rates and employers are likely to use educational qualifications when selecting and promoting employees.

Whatever the reasons, a large body of empirical research shows that education is an important influence on wages and earnings. Using Australian data collected in 1986, each additional year of education increases annual income by approximately $1500 (Marks, Western, & Western, 1989). Across industrialised nations the rate of income return from additional years of formal education is quite robust, around 10 per cent with the figure for Australia slightly less (McNabb & Richardson, 1989).

An alternative approach is to focus on qualifications rather than years of education. The returns to university degrees are higher than the returns to other forms of education. Using 1989-90 income data Gregory (1993) estimates that male employees aged 35-44 years with a university degree earned about 42 per cent more than males who left school at 17. Recent work from the United States suggests that the relative returns to higher education are increasing. However this is not the case in Australia where the relative returns to University degrees fell between 1968 and 1990. Similarly the returns to a non-trade diploma have fallen (Gregory, 1995). He also notes that the returns to trade and technical qualifications are considerably lower than returns to degrees and (non-trade) diplomas. The relatively low returns to trade and technical qualifications have been noted elsewhere. Long, McKenzie & Sturman (1996) found that the take home earnings of apprenticeships and TAFE graduates were about 10 per cent higher than those who had not completed year 12. However, there is little difference if the comparison group is year 12 completers. Focusing on ten trade occupations, Dockery and Norris (1996) found that for men in four groups of trade occupations their incomes were lower than for unqualified workers, on average. Among women, the average incomes of most tradespersons are lower than for unqualified workers.

Other factors that influence earnings require comment. Experience or years in the work force is commonly employed in analyses of earnings (Tigges, 1988). Within the framework of human capital theory the rationale for including experience is compelling. According to this theory, workers with more experience have better skills and work more efficiently than others, so are more valuable to the employer. Therefore they are paid more in accordance with their greater productivity or alternatively they can attract higher wages due to their superior market position. Even if more experienced workers are not more productive, there are good reasons why they can be expected to have higher incomes. For a start many awards have built in increments so that a worker with more experience in the same job will receive a higher income. In some organisations promotion is automatic given so many years service and promotion invariably means higher incomes. Furthermore, workers with a greater number of years' service in an organisation have had more time to climb organisational hierarchies and gain more highly paid positions.

A prominent factor in the study of income is gender. While the gender gap differs across industrial nations, on average women receive lower incomes than men. Studies indicate that the hourly wage rates of women are between 60 and 80 per cent of those of men. Interestingly, the gender gap in income is decreasing in many industrialised nations (Sorenson, 1991).

A great deal of research has investigated the causes of the income gap between males and females. One approach is to compare endowments such as educational qualifications, ability and experience. Until recently men have generally had more education than have women. Since education increases earnings, men's incomes will be higher. Similarly,

men have more experience in the labour force typically because the birth of children and their subsequent care interrupt women's labour force experience. An extension of this approach is to focus on the returns to endowments. It has been argued that men get paid more than women do even with equal educational qualifications. Similarly, the returns to experience in the labour force may be less for women compared to men. Another contributing factor is occupational segregation. A higher percentage of women tend to participate in a limited number of occupations: clerical, sales and lower professional jobs such as nursing and teaching. These predominantly female occupations do not attract high incomes. These factors do account for *some* of the gender gap. What remains is sometimes considered to be due to sexual discrimination.

Ethnicity and race also play a role in earnings. Newly arrived immigrants tend to be concentrated in lower paid jobs. Employers may pay ethnic workers lower wages because of their lower levels of education, perceptions about their marginal productivity, or simply because of discrimination. Race is also an important aspect of income inequality. Indigenous groups such as the Australian Aborigines earn considerably lower incomes than the national averages. In the United States, African Americans have lower average incomes than American whites. The same arguments that apply to gender about differences in endowments, differential returns to endowments and labour market segregation also apply to ethnic and racial groups. Group differences in the *returns to* endowments rather than differences *in the level of endowments*, provide evidence of systematic discrimination.

Recently research into income disparities has found that cognitive skill or ability measured during adolescence has a substantial impact on adult incomes (Bedard & Ferrall, 1996). Analyses that do not include measures of ability upwardly bias estimates of the returns to educational qualifications by as much as 40 per cent (Blackburn & Nuemark, 1995). Although in this study we use school achievement in literacy and numeracy rather than ability, achievement includes a substantial ability component. For Australian data, Karmel (1995) estimates that the returns to a degree decline by about 30 per cent once achievement is taken into account. In the United States, the impact of cognitive skill on income appears to be increasing (Murnane, Willett, & Levy, 1995).

INFLUENCES ON EARNINGS - CORRELATIONAL ANALYSES

Table 1 presents the correlations of hourly earnings with a range of social, educational and labour force variables. Before discussing these results it is worth remembering that these cohorts have had different lengths of time in the labour force so the correlations are not comparable over time. However, the size of the correlations within cohorts can be compared to show which factors have stronger associations with earnings.

The correlations with age are large because it combines several effects, seniority, the acquisition of qualifications, and wage inflation. However, these correlations are suggestive of strong ageing and contextual effects. In subsequent multivariate analyses the effect of age remains strong despite controlling for qualifications and time in the labour force.

Table 1 Correlation Coefficients of Hourly Wages with Social Background, Educational Qualifications and Labour Market Experience

	Cohort Birth Year		
Factor	1961	1965	1970
Age	0.77	0.73	0.65
Gender (Male)	0.12	0.11	0.06
Parental Occupational Status	0.08	0.09	0.08
School Achievement	0.12	0.08	0.10
Year 12 Completion	0.13	0.19	0.17
Degree	0.33	0.30	0.24
Apprenticeship	0.13	0.11	0.15
Doctorate (Ph.D)	0.10	0.04	-
Other Qualifications (Private)	0.11	0.10	0.08
Certificate at CAE/University	0.02	0.02	0.04
Certificate at TAFE	0.10	0.08	0.10
Post-Graduate Diploma	0.10	0.09	0.05
Diploma at CAE/University	0.12	0.13	0.12
Diploma at TAFE	0.04	0.05	0.06
Percent Time Employed Full-Time	0.03	0.15	0.17
Percent Time Unemployed	-0.11	-0.15	-0.07

Note: These correlations are based on the correlation between earnings and the particular factor in each year averaged for all years the cohorts were surveyed (see Appendix1).

As expected, there is a correlation between earnings and gender reflecting the gender gap in income. A rough calculation from this estimate indicates that men's hourly earnings are on average about 12 per cent higher than women's hourly earnings for both the 1961 and 1965 cohorts. The gap is smaller for the 1970 cohort. This is lower than many estimates of the gender gap but here we are dealing with young people with limited time in the labour market.

The correlation of school achievement with hourly earnings is moderate. There is no indication here that its correlation is changing over time. Additional analyses showed that there was little difference in the magnitude of this particular correlation for men and women.

Socioeconomic background (measured by parental occupational status) also shows a moderate correlation with hourly earnings. Further analyses of the correlation with parental occupational status (not shown) revealed that the correlation was weaker at younger ages and increased as the cohort grew older. This pattern was mainly due to the tendency for respondents from higher occupational status backgrounds gaining degrees.

Completion of year 12 has a substantial correlation with hourly earnings. The correlation appears to be increasing over time. Subsequent analyses show that within cohorts year 12

completion is associated with higher earnings but the increment declines as the cohort ages. This explains why its effect appears to be stronger in the younger cohorts.

The qualification with the strongest correlation with earnings is a degree. There is some indication of a weakening correlation, but the younger cohorts have had less time in the labour market since graduation. Apprenticeships, TAFE certificates, post-graduate diplomas and University or CAE diplomas and other qualifications obtained privately have lower correlations with hourly earnings. There is little change in the magnitude of most of the correlations between the three cohorts.

Percentage of time employed full-time has moderate correlations with earnings for the 1965 and 1970 cohorts and only a weak correlation in the 1961 cohort. The weak correlation for the 1961 cohort is because most respondents in this group have completed their post-secondary qualifications so that a substantial proportion earn higher incomes with only a limited amount of labour market experience. The results obtained from the additional multivariate analyses explain the higher correlation found for the 1965 and 1970 cohorts. The higher correlation is mainly due to apprenticeships providing both higher earnings during the early career and stable full-time employment.

The greater the proportion of time spent unemployed, the lower the hourly earnings. This result indicates that those who experience frequent bouts of unemployment tend to be employed in low paying jobs when they are part of the labour force.

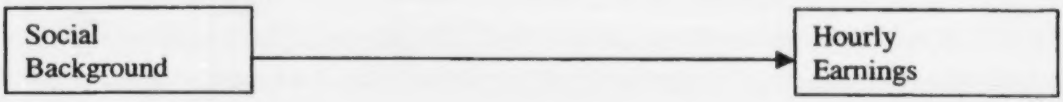
In general these findings correspond with the findings in the literature. Degree holders earn higher salaries followed by those with other qualifications. The question is to what extent can the size of these correlations be attributed to correlations with other variables. For example, degree holders tend to score higher on the school achievement tests and almost necessarily have completed year 12. Similarly, a proportion of TAFE graduates has also completed year 12 and may also hold other qualifications. The following section discusses the independent or net effects of educational qualifications and other factors on hourly earnings.

INFLUENCES ON EARNINGS - POOLED ANALYSIS

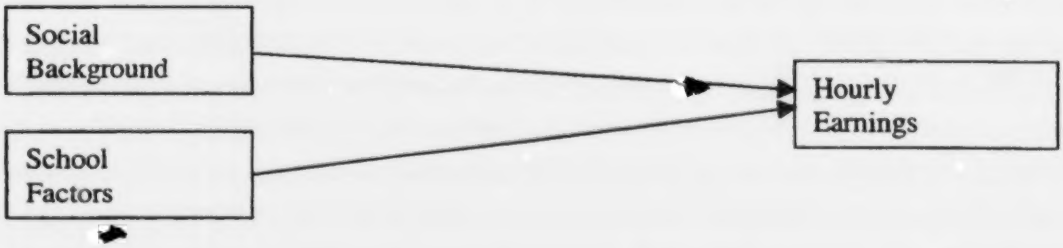
This section reports the results of the multivariate analyses on hourly earnings. Four groups of variables were included in these analyses: social background, demographic and contextual variables; school variables (school sector and achievement in literacy and numeracy); post-secondary school qualifications; and employment experience. These analyses allow identification of the direct effects of social background, educational qualifications and labour market experience on earnings. The longitudinal data employed here allow isolation of the effects of age independent of experience in the work force. In addition, these analyses include a measure of the overall unemployment rate to test if aggregate unemployment and earnings are related in these youth cohorts.

Four models were analysed in order to estimate the total and direct effects of factors influencing hourly earnings. These groups of factors form a temporal sequence with social background most removed in time from the measurement of hourly earnings followed by school factors, qualifications, and with prior employment experience being the most proximate influence on earnings. This is the same procedure used in the analysis of unemployment incidence in LSAY Research Report No 7.

Model 1



Model 2



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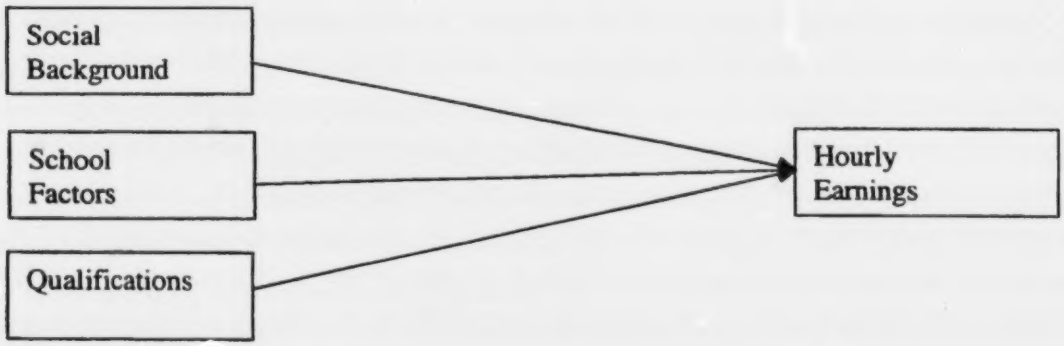

Model 4

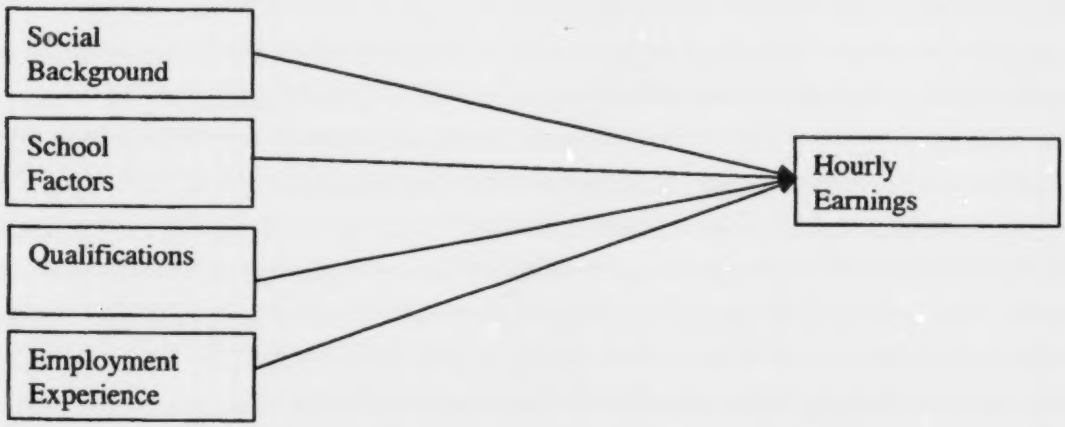

Figure 1 Models of Hourly Earnings Showing the Groups of Factors Analysed

The first model (Model 1) specifies social background factors as influences on earnings. In these analyses we isolate the total effects of age, gender, parental occupational status, residence and ethnicity on hourly earnings. Model 2 adds school factors, specifically school sector and achievement in literacy and numeracy. The results from this model show the total effects of school factors on earnings. In addition, the effects for the social background factors are the direct effects net of school factors. Model 3 adds educational qualifications. The total effects for educational qualifications are estimated as well as the direct effects of social background, net of school factors and qualifications, and the direct effects of school factors net of qualifications. The final model (Model 4) adds employment experience. This model produces the direct effects of qualifications, school and social background factors net of employment experience. The four models are presented diagrammatically in Figure 1.

These total and direct effects are of interest because they show the overall (total) effects of factors such as socioeconomic background, non-English speaking background, attendance at a Catholic or independent school and school achievement, as well as their direct effects net of more proximate influences.

The findings discussed here focus on the results obtained from analysis of Model 4. The text does refer to the total effects found from the analysis of other models. The reason for concentrating on Model 4 is that this model shows the direct effects for social background, school and educational factors net of the effects of employment experience. Generally, analyses of earnings focus on the direct effects including measures of education and experience excluding background and school factors. In contrast to the analyses of unemployment incidence (in LSAY Research Report No 7) the effects of employment experience do not subsume the effects of other factors.

Figures 2 and 3 present the percentage differences on hourly earnings. Figure 4 presents the percentage differences for the four continuous variables, parental occupational status, school achievement, age and the overall employment rate. (In these and later Figures, effects not statistically significant are displayed as having no effect.)

These percentage effects correspond to the logistic estimates for Model 4 presented in Table A4 of Appendix 2. The relationship between percentage differences and logit regression coefficients is discussed in Appendix 1.

In Appendix 2 we also present the total effects for social background (Table A1), school factors (Table A2) and qualifications (Table A3). These analyses correspond to Models 1, 2 and 3. These total effects may be of interest to some readers since they show what are the total or overall effects of factors such as socioeconomic background, non-English speaking background, attendance at a Catholic or independent school, and school achievement.

The results presented in the Figures are for men and women combined. Tables A1 to A4 also present the results obtained from separate analyses of men and women.

Social Background, Demography and Context

Figure 2 presents the percentage effects on hourly earnings of social background, demographic and contextual variables from analysis of Model 4. These have been converted to percentage effects from the actual estimates which can be found in Appendix 2 (Table A4). Figure 4 presents the total effects for the continuous measures; occupational background (Model 1), school achievement (Model 2), and the direct effects of age (Model 4) and the overall unemployment rate (Model 4).

Age

The effect of age is considerable showing that hourly earnings increase between 8 and 14 per cent annually (Figure 4). The effects of age appear very strong compared to other factors (Figure 4). However, this age effect includes both the substantial effects of wage inflation and seniority. The strong yearly increase in earnings for the 1970 cohort is mainly due to seniority since they are moving from junior to adult wages. In contrast the effects for the 1961 and 1965 cohorts are mainly due to the high levels of inflation during the 1980s. The effects of age are similar for men and women (Table A4)

Gender

The hourly earnings of young men are considerably higher than those of young women. However, there is evidence that the gap is narrowing: 14 per cent in the 1961 cohort, 11 per cent in the 1965 cohort and 6 per cent in the 1970 cohort (Figure 2).

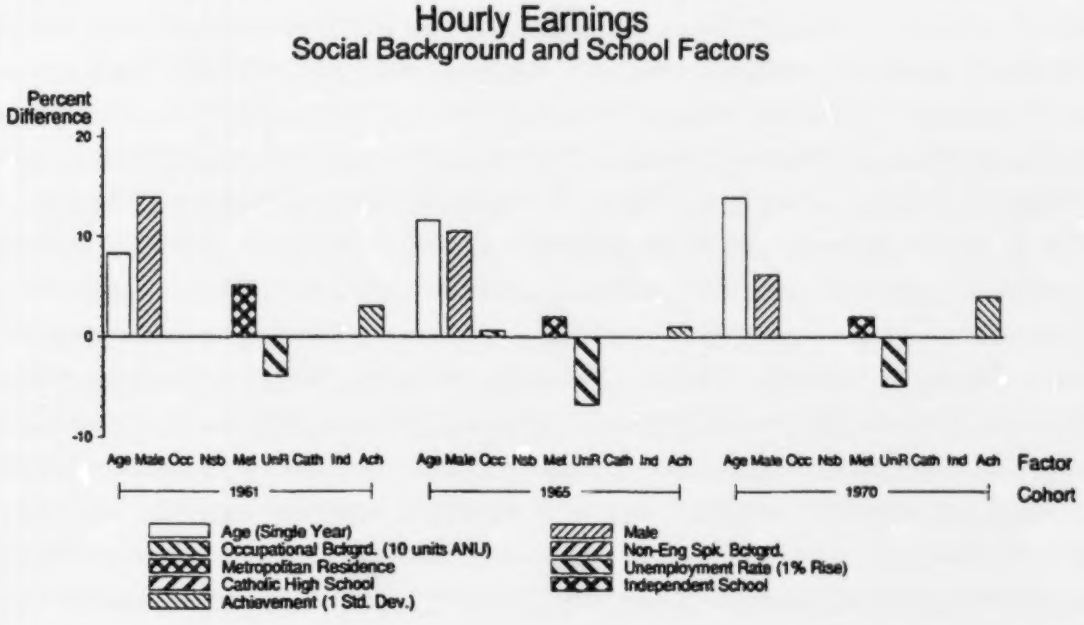

Figure 2 Effects of Social Background and School Factors on Hourly Earnings

Further evidence of a decline in the gender gap comes from analyses of specific age groups presented in the next section. These estimates of the gender gap in earnings are lower than estimates for adult population samples but it is important to note that since these cohorts are young, part-time and casual work are included in these estimates. Women are more often employed in part-time and casual work often at relatively high hourly rates.

Socioeconomic Background

The effect of socioeconomic background on hourly earnings is small. Only two of the nine estimates in the fully specified model reached statistical significance (Table A4). In the 1965 cohort this effect was significant but small, a 10-point increase in parental occupational status on the ANU2 scale translates to only a 1 per cent increase in hourly earnings (Figure 2). Figure 4 shows the total effects of occupational background for the range of socioeconomic status scores. These total effects are also small. There is a tendency for the effects of parental occupational status to be larger for females than for males (Table A1). These effects were reduced to insignificance with the addition of qualifications to the analysis (in Model 4). The total effects were larger as the cohorts aged but this was due to indirect effects through educational qualifications.

Ethnic Background

Having parents who were born in a non-English speaking country did not influence hourly earnings. The effects were small and none reached statistical significance. This finding was not due to differences on other factors since a significant total effect was found only for the 1961 cohort (Table A1). In this instance, the hourly earnings for persons from non-English speaking backgrounds were about 4 per cent lower than those from English speaking backgrounds. However, no difference was found after the addition of school factors (Table A2). Therefore, there is no evidence to suggest that, among these youth cohorts, persons from non-English speaking backgrounds are directly discriminated against in regard to earnings. This conclusion contrasts with the finding from LSAY Research Report No 7 which found that males from non-English backgrounds have a higher probability of becoming unemployed, other things being equal.

Area of Residence

Living in a major metropolitan area (while at secondary school) had a slight beneficial effect on hourly earnings. Living in a major metropolitan area increased hourly earnings up to about 7 per cent for the 1961 cohort and about 2 per cent in the two younger cohorts (Figure 2). Therefore, there are indications that the differences in earnings due to region (defined in this manner) are declining. The lower earnings in non-metropolitan areas are not due to differences in achievement, qualifications or labour force experience (Tables A2 to A4). This indicates that persons with comparable endowments earn lower wages in non-metropolitan areas.

Overall unemployment rate

Overall unemployment rates had a highly significant effect on hourly earnings. A 1 per cent rise in the overall unemployment rate was associated with decreases in hourly earnings: of about 4 per cent in the 1961 cohort, 8 per cent in the 1965 cohort and 5 per cent in the 1970 cohort. Over all the time periods of these data collections, differences in the unemployment rate had a substantial effect on hourly earnings (Figure 4). There was no difference in this association between men and women (Table A4).

School Variables

School Sector

Attendance at an independent school or Catholic school had no effect on earnings, after controlling for other factors. None of the net differences in earnings due to school type were significant (Figure 2, Tables A3 and A4). However, there were significant total effects on earnings attributable to school type (found from analysis of Model 2). In the 1961 cohort, young people who attended an independent school enjoyed 5 per cent higher earnings than those who attended a government school (Table A2). For women in the 1965 cohort attendance at a non-government school increased hourly earnings, by around 9 per cent for independent schools and 4 per cent for Catholic schools. These differences did not survive the next stage of the modelling process (Model 3), the inclusion of educational qualifications (Table A3). These total effects of attendance at an independent school on earnings especially for females are noteworthy since these analyses control for socioeconomic background (Table A2). Therefore, the analysis indicates that attendance at an independent school may affect earnings indirectly through qualifications.

School Achievement

The total effects of school achievement are presented in Figure 4. Its effects on earnings are moderate and stronger than the effects of occupational background. This result is not surprising since higher levels of school achievement are associated with school completion and university qualifications.

The more surprising result is that the direct effects of school achievement were also statistically significant. A one standard deviation difference increases hourly earnings by around 3 per cent in the 1961 cohort, 2 per cent in the 1965 cohort and 4 per cent in the 1970 cohort (Figure 2, Table A4). A two standard deviation difference in achievement almost doubles these percentage differences. Therefore, school achievement increases hourly earnings net of qualifications. In other words, within groups with the same educational qualifications, those who scored higher in the achievement tests enjoy higher earnings. It should be kept in mind that the results from the following section show that achievement had a zero or negative effect on earnings at ages 18 to 22 in the 1961 and 1965 cohorts. Therefore the direct effects of achievement at ages older than 22 are larger than presented in Figure 2 and Table A4.

Educational Qualifications

Before discussing the returns to qualifications, it should be kept in mind that the returns discussed here are for the whole survey period for each cohort. The following section shows that the size of the returns varies according to the age of the respondents. In addition, the results for the 1970 cohort may be unreliable given that many people aged 18-24 are finishing qualifications and are in a state of transition.

Degrees

The strongest influence on hourly earnings was a degree. Degrees increased earnings by 22 per cent in the 1961 cohort and slightly less (19 per cent) in the 1965 cohort (Figure 3). A doctorate additionally increased earnings in the 1961 cohort but only for men (Table A4). These effects for a degree are in addition to the increases in hourly earnings due to year 12 completion.

Apprenticeships

Apprenticeships did produce increases in hourly earnings: by 6 per cent in the 1961 cohort, by 11 per cent in the 1965 cohort and by 16 per cent in the 1970 cohort (Figure 3, Table A4). Although the returns to men for apprenticeships are substantial it should be remembered that apprentices in these cohorts tended not to have completed year 12 so overall the returns to apprenticeships are substantially less than for degree. It should be noted that although the returns to apprenticeships are lower than those for degrees, the *rate of return* is likely to be higher since the costs of doing an apprenticeship are considerably lower than the costs of obtaining a degree.

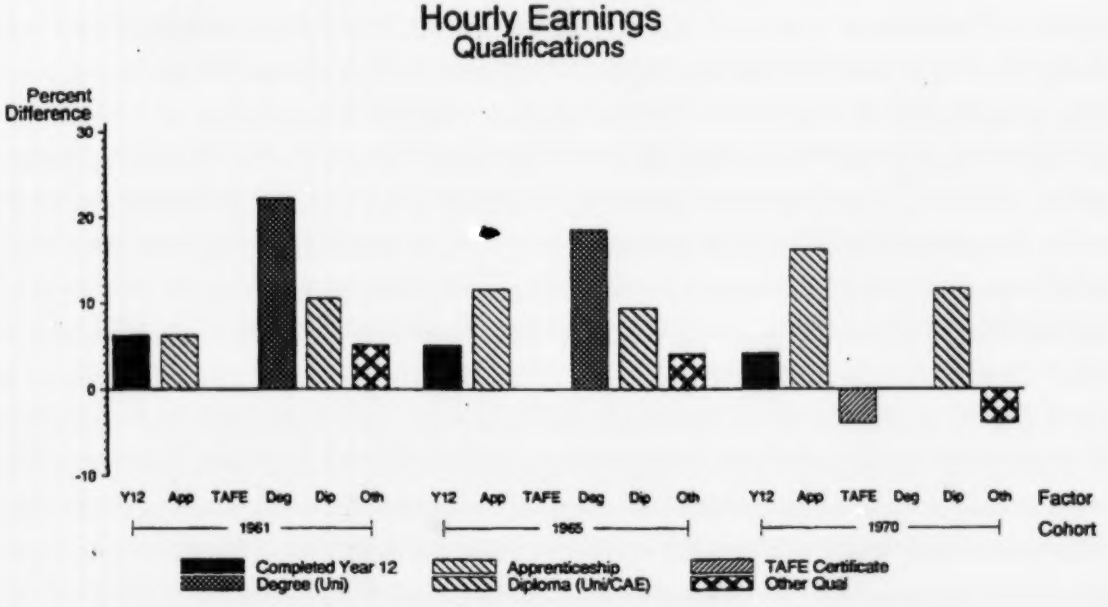

Figure 3 Effects of Qualifications on Hourly Earnings

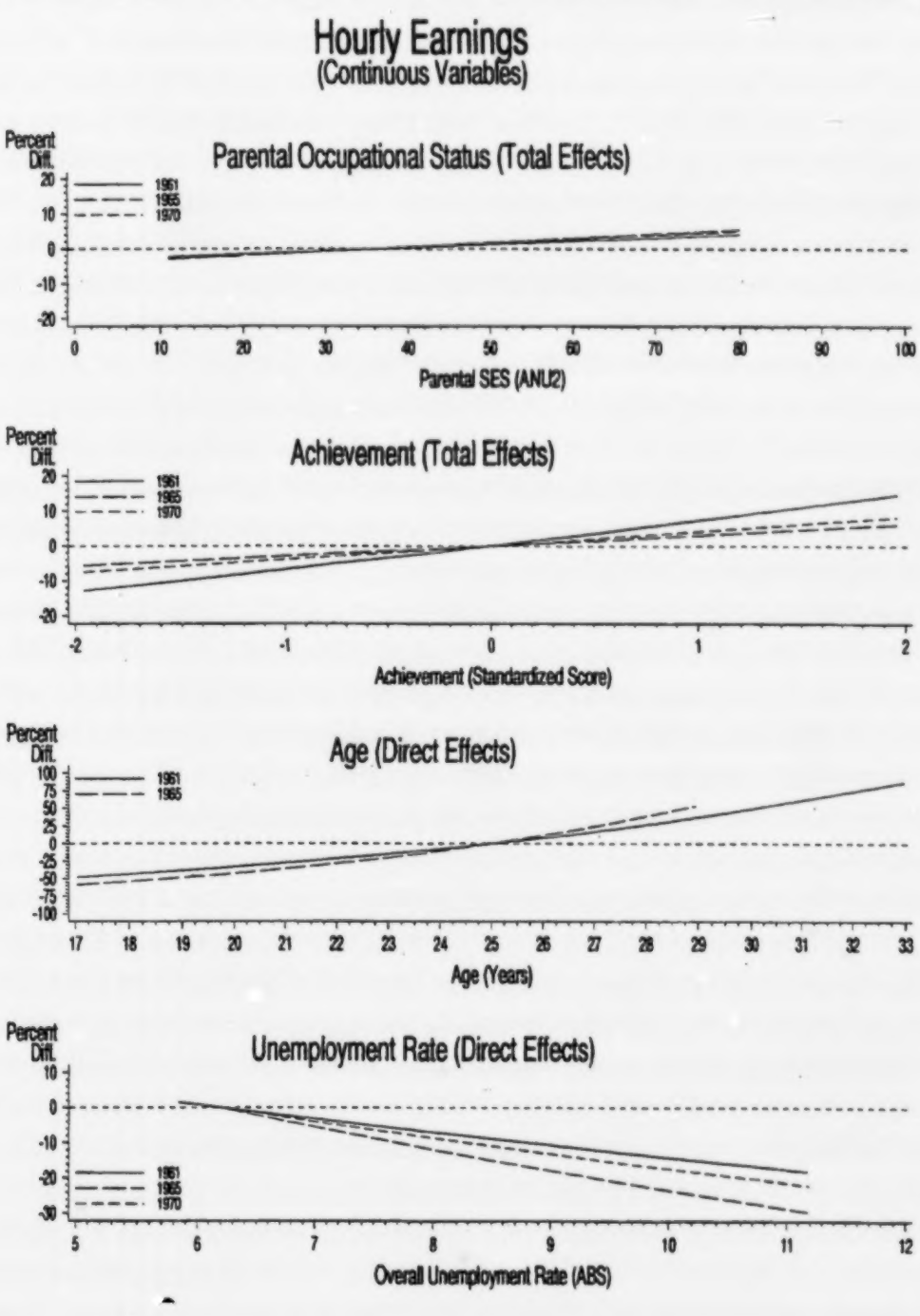

Figure 4 Effects of Occupational Background, School Achievement, Age and the Unemployment Rate on Hourly Earnings

The apparent increase in returns to apprenticeship between cohorts is an artefact of the length of time the cohorts have been in the labour force. The returns to apprenticeships are higher at younger ages so that the returns in the 1970 cohort appear higher. This finding is discussed in the next section.

There are considerable gender differences in the returns to apprenticeship. For the 1961 cohort apprenticeships increased hourly earnings for males by 5 per cent and for females by 12 per cent (although there were far fewer women who had completed an apprenticeship in this cohort) (Table A4). For the 1965 and 1970 cohorts the effects were larger for men than for women, increasing men's hourly earnings by 11 per cent for the 1965 cohort and 16 per cent for the 1970 cohort. It should be noted that there is a wide disparity in the types of apprenticeships men and women take. Men are most often involved in the traditional trades, whereas women's apprenticeships tend to be limited to hairdressing and hospitality.

Diplomas

A diploma gained at a University or CAE increased hourly earnings by around 10 per cent in all three cohorts (Figure 3). However, the benefits to earnings from diplomas are generally confined to women. In the 1961 cohort, a diploma increased earnings for women by 15 percent, 12 per cent in the 1965 cohort and 13 per cent for the 1970 cohort. There were no significant effects for men (Table A4).

Completion of a post-graduate diploma did not significantly add to hourly earnings in the 1961 and 1965 cohorts. In the 1970 cohort, a post graduate diploma significantly increased earnings by around 10 per cent (Table A4).

Year 12 Completion

Year 12 completion had a substantial impact on hourly earnings of between 4 and 6 per cent (Figure 3). The returns to year 12 completion were generally higher for women: around 8 per cent in the 1961 and 1970 cohorts and 11 per cent in the 1965 cohort. For men born in 1961, the return to year 12 completion was around 5 per cent but of no consequence for men born in 1965 or 1970. Year 12 completion appears to have a positive impact on earnings for women but less so for men.

TAFE

TAFE certificates and diplomas gained at a TAFE college did not have an appreciable effect on earnings. Only among males in the 1965 cohort was there an increase in hourly earnings (of about 6 per cent). In the 1970 cohort, TAFE certificates proved to be detrimental: reducing returns by 4 per cent, with a stronger effect among women (Figure 4, Table A4).

Other Qualifications

Qualifications gained at a private institution increased earnings by around 5 per cent in the 1961 and 1965 cohorts but decreased earnings in the 1970 cohort (Figure 3). These effects were again confined to women (Table A4). For women in the 1961 cohort, 'other' qualifications increased earnings by 7 per cent and by 4 per cent for the 1965 cohort. For women in the 1970 cohort, such qualifications decreased earnings by around 4 per cent. Amongst men in all 3 cohorts there were no significant effects.

Labour Force Experience

The effects of labour force experience on earnings in these cohorts were very weak. In the 1961 cohort, a 10 per cent increase in the time spent employed full time increased earnings by about 1 per cent. This effect was smaller in the 1965 cohort and negative in the youngest cohort. This contrasts with the strong effects labour force experience has on unemployment (LSAY Research Report No 7). The following section shows that the returns differ according to age group such that the returns are stronger in older age groups but minimal (or negative) in younger age groups.

EFFECTS ON EARNINGS - COHORT AND AGE EFFECTS

The purpose of the analyses presented in this section is to draw conclusions about cohort and ageing effects by providing both between and within cohort comparisons. Tables A5 to A7 (Appendix 2) present the effects of gender, achievement, year 12 completion, educational qualifications and labour force experience at three age groups: 18 to 22; 23 to 27; and 28 and older. Selections of these results are displayed in Figures 5 to 8. These analyses do not include measures of socioeconomic background, non-English speaking background, age, school type, or the annual unemployment rate. The previous sections showed that socioeconomic background, ethnicity and school type had minimal effects on earnings when controlling for qualifications and labour force experience. Age and the annual unemployment rate cannot be included because of the limited age ranges in these analyses. Since we only have data for the 1970 cohort until 1994 the middle group only includes 23 and 24 year-olds for this cohort. The oldest age group for the 1961 cohort is 28 to 33, and 28 to 30 for the 1965 cohort.

Gender

These analyses confirm the decline in the gender gap in hourly earnings suggested by the discussion in the previous section. Between 23 to 27 years of age is about 12 per cent. In the 1970 cohort, the estimate is about 6 per cent. In addition, the gender gap in earnings after age 28 is smaller in the 1965 cohort than in the 1961 cohort. Therefore, there are strong indications that the gender gap in earnings, net of qualifications, achievement and employment experience is declining (Figure 5).

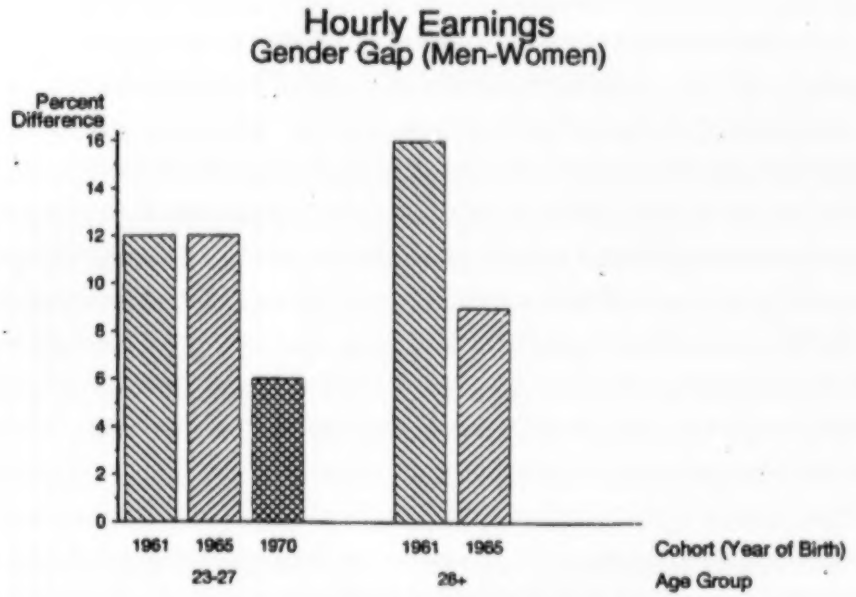

Figure 5 Differences (net) in Male Hourly Earnings over Female Hourly Earnings for the three Cohorts by Age Group

School Achievement

School achievement in literacy and numeracy had a significant effect on earnings net of educational qualifications and labour market experience in the two older age categories (Figure 6). The effects of achievement in these groups are stronger than those found in the pooled analyses discussed in the previous section since achievement tends to have small or negative effects in the youngest age group. Between 23 and 27 years of age, a one standard deviation increase in achievement increases hourly earnings by about 3 per cent in the 1961 cohort and by about 6 per cent in the 1965 cohort. After age 28, a one standard deviation increase in achievement is reflected in a 4 and 7 per cent increase in earnings in the 1961 and 1965 cohorts, respectively. These percentage increases are approximately doubled for a two standard deviation difference. Therefore the effect of achievement increased as the two older cohorts aged and is stronger in the younger (1965) cohort (as shown in Figure 6). The effects of achievement on earnings did not differ between men and women (Tables A5 to A7).

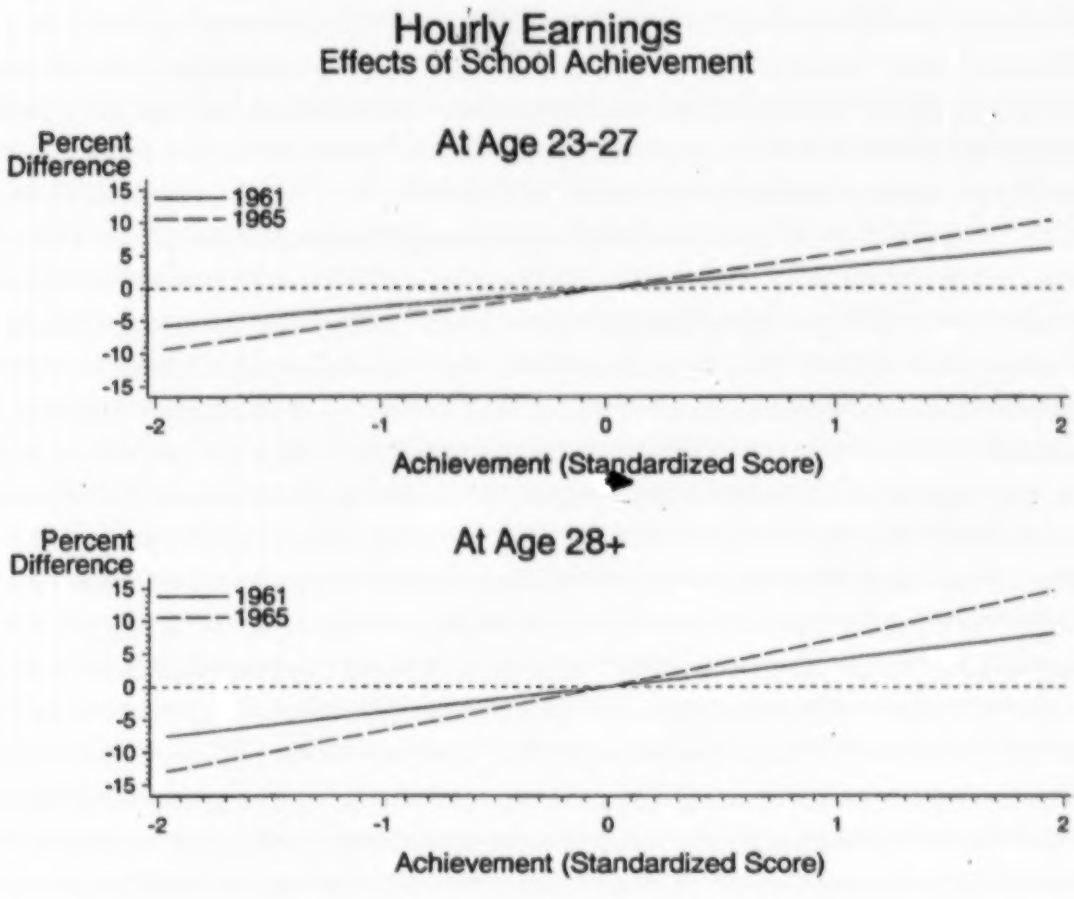

Figure 6 Effects of School Achievement on Hourly Earnings by Cohort by Age Group

Educational Qualifications

As discussed earlier, year 12 completion increases hourly earnings controlling for other factors. The effects are greater in the 1965 cohort than in the 1961 cohort. The largest effect was among 18-22 year-olds in the 1965 cohort, where hourly earnings were 22 per cent higher for those who had completed year 12 compared to those who had not. This declined to around 6 per cent when this cohort was between 28 and 30 years old, comparable to its effect at this age for the 1961 cohort. For the 1970 cohort the returns for year 12 completion were slightly lower than those for the 1965 cohort (Figure 7). In each of the three cohorts there is a consistent pattern where the increases in earnings due to year 12 are greatest at younger ages but decline thereafter (Figure 7). There were no consistent gender differences in the returns to year 12 completion (Tables A5 to A7).

The qualification with the largest effect on hourly earnings is having a degree. The effect of a degree at age 18 to 22 was very strong in the 1965 and 1970 cohorts but weaker in the 1961 cohort (Figure 7). However, there were few degree holders in this age group so we cannot draw conclusions about this effect between cohort differences. For the age group 23 to 27 years old, the returns to degrees were larger in the 1965 cohort than in the 1961 cohort. At 28 years of age and older, the effect of having a degree was comparable in the 1961 and 1965 cohorts, increasing hourly earnings by about 23 per cent. In both cohorts the relative returns to a degree were higher when they were aged 28 and older compared to when they were aged between 23 and 27 (Tables A5 and A6).

It needs to be emphasised that almost all degree holders had completed year 12 so that the difference in hourly earnings is considerably greater than indicated by the reported estimates. For example, the difference between degree holders and those who had not completed year 12 in hourly earnings, after 27 years of age, is over 30 per cent.

In the 1961 cohort, the returns to a degree were similar for men and women (Table A5). In contrast for the 1965 and 1970 cohorts, the returns to degrees were higher for men than for women (Tables A6 and A7). This finding suggests that women are less well rewarded for degrees than are men. So despite a decline in the gender gap overall, there appears to be an emerging gender disparity in the returns to degrees. This difference in returns makes a substantial contribution to the gender gap in the 1965 cohort. Further analyses are required to test whether this result is due to gender differences in the type of degree (different endowments) or is a case of differential returns to endowments.

Having gained a doctorate had little effect on earnings net of having a degree. Only after age 28 was there a significant effect and then only amongst men (Tables A5 to A7).

A diploma gained at a University or CAE had substantial effects on earnings. In the 1965 and 1970 cohorts, these diplomas brought very high increases in initial earnings among 18 to 22 year olds: nearly 50 per cent in the 1965 cohort and 35 per cent in the 1970 cohort. Between ages 23 and 27, diplomas increased earnings by around 16 per cent for the 1961 cohort and 11 per cent for both the 1965 and 1970 cohorts. At age 28 and above, a university or CAE diploma generally had weaker effects on earnings (Figure 7).

The returns to diplomas for men are substantially and consistently smaller than the returns for women (Tables A5 to A7). This finding shows that group differences (such as between men and women) in the returns to qualifications are not consistent across qualifications (or endowments).

Diplomas gained at a TAFE college had a much weaker impact on earnings. Its impact was confined mainly to males and in the youngest age group. Between 18 and 22 years of age, the returns to TAFE diplomas were between 15 and 25 per cent in the 1965 and 1970 cohorts. (There was no significant impact in the 1961 cohort). At older ages diplomas gained at a TAFE institution brought no significant increase in earnings. Similarly, post-graduate diplomas increased earnings initially at ages 18 to 22 (in the 1965 and 1970 cohorts) but had no impact thereafter (Tables A5 to A7).

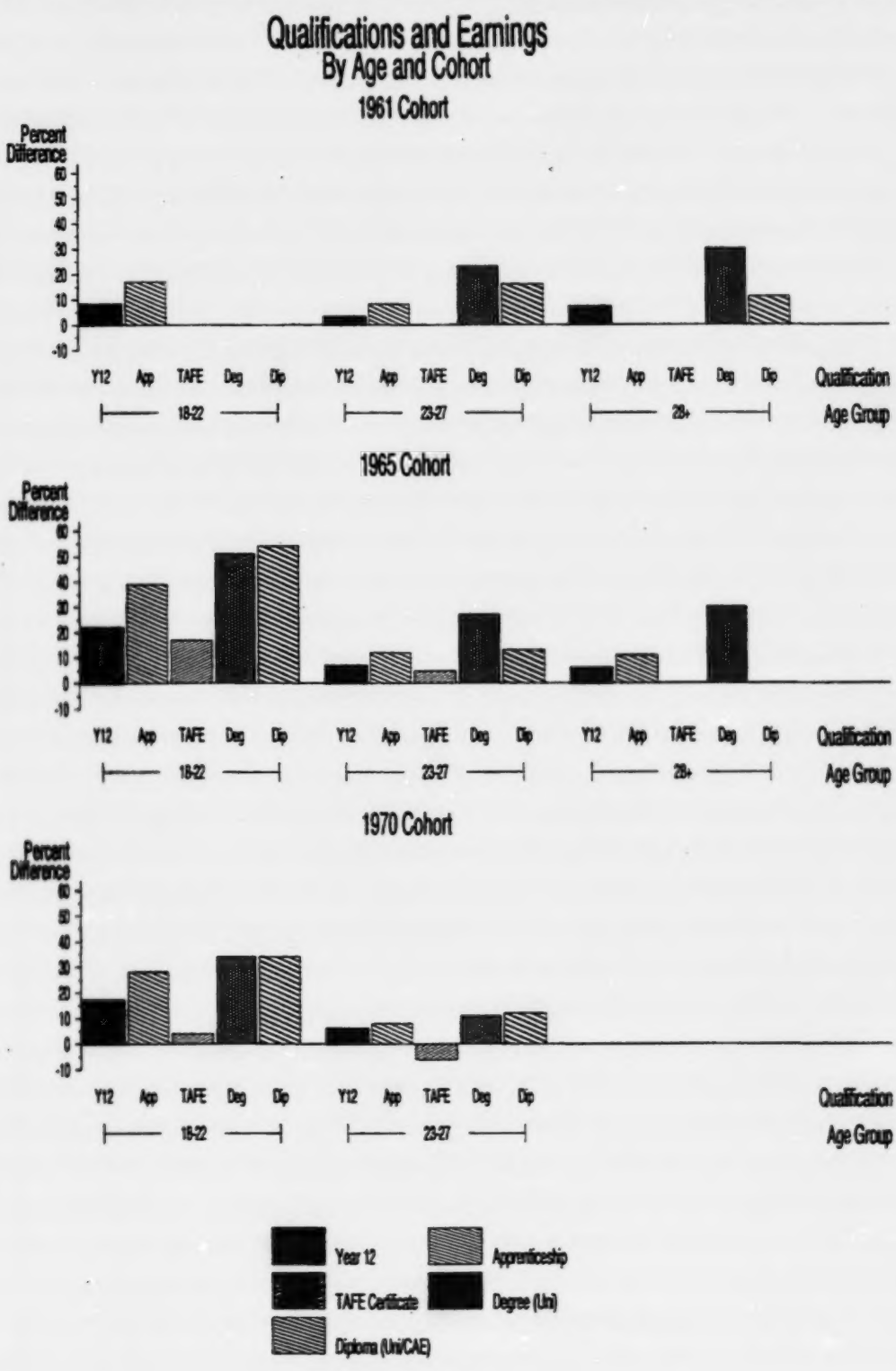

Figure 7 Net Effects of Qualifications on Hourly Earnings for the Three Cohorts by Age Group

Between 18 and 22 years of age, the returns from apprenticeships were substantial. In the 1961 cohort the return to apprenticeships was around 17 per cent, in the 1965 cohort nearly 40 per cent and in the 1970 cohort 28 per cent. The high return from apprenticeships in this age group was not matched as the cohorts aged, the returns dropping to around 10 per cent in the 23 to 27 age group (Figure 7). When the 1961 cohort was between 28 and 33 years old, an apprenticeship had no significant impact on earnings. Therefore the relative advantage in earnings due to apprenticeships declines as youth cohorts age. Gender differences in the returns to apprenticeships were not consistent, since in these cohorts there are relatively few women who complete apprenticeships and there are composition changes over time in the types of apprenticeships that men and women undertake.

The returns to TAFE certificates were smaller than the returns to Apprenticeships. Only among 18 to 22 year-olds in the 1965 cohort were there substantial returns to TAFE certificates (especially among men). Men in the 1961 cohort received moderate returns from TAFE certificates when they were between 23 and 27 years old (Table A5). Otherwise the returns to TAFE certificates were negligible and in some instances negative (Figure 7).

As was the case for apprenticeships, qualifications gained at a private institution brought substantially higher hourly wages in the youngest age groups but declined as the cohorts aged (Tables A5 to A7). Between 18 and 22 years of age 'other' qualifications increased hourly earnings by 15 per cent in the 1961 cohort, 18 per cent in the 1965 cohort and by 6 per cent in the 1970 cohort. Between 23 and 27 years of age, the effect was smaller: at 7 per cent in the 1961 and 1965 cohorts, and no effect in the 1970 cohort (Tables A5 to A7). These results suggest that 'other' qualifications are becoming less beneficial to hourly earnings.

A certificate at a University or College of Advanced Education did not have significant effects on earnings in the 1961 and 1965 cohorts. Such qualifications did increase earnings in the 1970 cohort (by about 20 per cent) but only between the ages of 18 and 22 (Tables A5 to A7).

Labour Market Experience

Labour market experience does contribute to hourly earnings but its effects are very weak (Figure 8). For example, a 10 per cent difference in the percentage of time spent in full time work among males born in 1965, increased earnings by only 1.7 per cent.

Comparisons of larger differences in experience show more substantial differences in earnings but such comparisons apply to very few respondents. In the 1961 cohort, the effect of experience in full-time work increases with age but no such pattern is evident in the 1965 cohort. Between cohorts, its impact is stronger in the two younger cohorts than in the 1961 cohort (as shown in Figure 8).

In the 1961 cohort the returns to experience were much the same for men and women. However in the two younger cohorts, women enjoy smaller returns than do men from similar levels of full time employment experience.

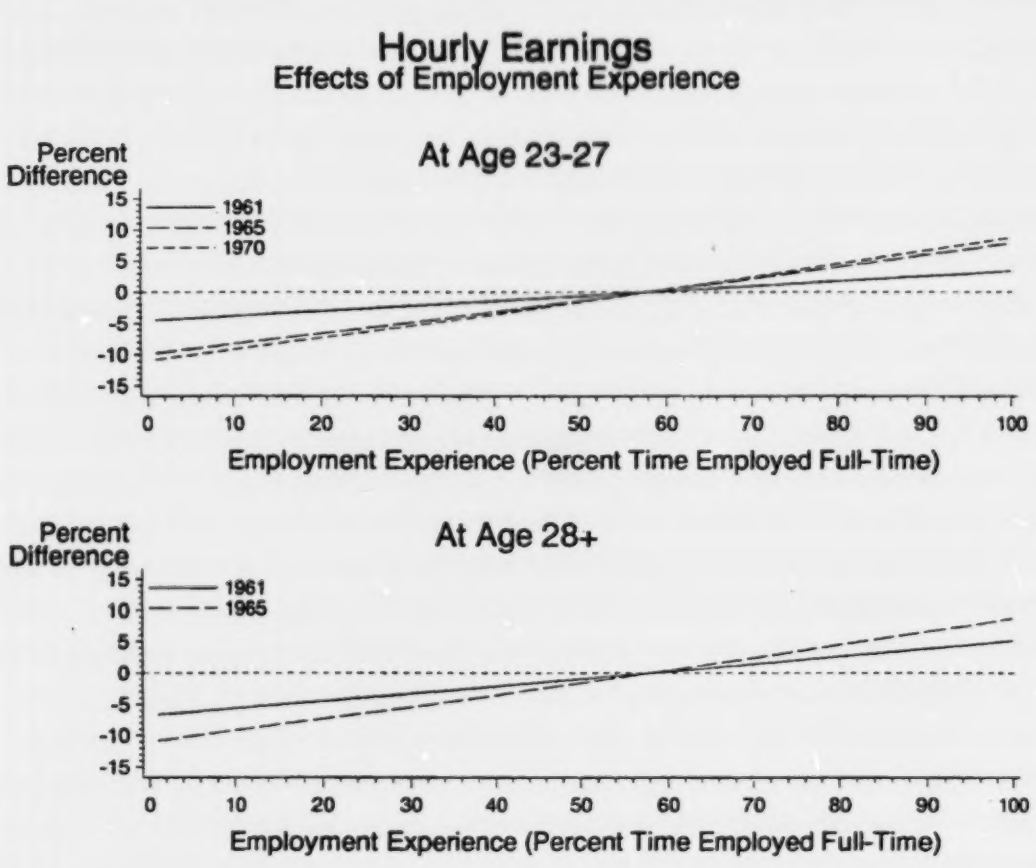

Figure 8 Effects of Employment Experience on Hourly Earnings by Cohort by Age Group

CONCLUSIONS

This discussion will focus on several issues regarding hourly earnings addressed by these data and analyses. These issues are the effects of achievement, the gender gap, the role of social background, the returns to educational qualifications and the influence of the overall unemployment rate.

This study shows that school achievement in reading comprehension and numeracy has a moderate impact on earnings. This result is not surprising given that other research has found effects of 'ability' on income. Nonetheless, it is remarkable that students' scores on tests are associated with higher earnings 10 and 15 years after the tests were taken, independent of educational qualifications and employment experience.

Furthermore, the impact of achievement on earnings strengthens as a cohort grows older. Before the age of 22 there was little impact, sometimes even decreasing earnings. Between 23 and 27 years of age its effect was moderate and at 28 years and older the effect was slightly stronger. These results indicate that the skills and knowledge measured by literacy and numeracy tests do make people more productive, and thereby increase their earnings, as human capital theory would suggest.

As well as intra-cohort increases in the effects of school achievement on earnings, there are indications that its effect is increasing between cohorts. One possible explanation for this finding is an increased importance of literacy and numeracy skills in the workplace associated with the requirements of modern technology.

Achievement measures have two components, both school learning and underlying ability. It is the balance between these two components which is important to the policy implications of the effects of school achievement. There is a variety of factors, other than ability, that may affect school achievement such as social background, school sector, teacher quality and school curriculum. However, these factors only partially explain variation in achievement test scores. Together with school effects they explain up to 30 per cent of the variation in achievement scores. In addition there is an error component, which may account for between 20 and 30 per cent of the variation in test scores. Although this implies that ability could account for the remaining 40 per cent of the variation in school achievement, ability is by no means insensitive to the social and school environments. Therefore up to 50 per cent of the variation in school achievement is potentially open to the effects of educational and social policies.

The most important questions are whether higher performance in literacy and numeracy at school would produce a more productive work force, and help young people find work. From the results of this study, and companion report on youth unemployment (LSAY Research Report No. 7), the answer would be 'yes'.

An important aspect of the youth labour market investigated in this study is the gender gap in earnings. In accordance with overseas studies, there appears to be a narrowing of the gap in male and female earnings over time in these youth cohorts. This conclusion is not surprising given the concern governments have shown about gender inequality in the workforce and the policies instigated to remedy the situation. However, we did find that the earnings benefits of degrees were lower for women than for men so further research needs to be done in this area.

The inability of differences in qualifications and experience to account for the gender gap in earnings in these cohorts is again not surprising. In these age groups, women tend to have comparable or better educational qualifications than men. In addition, these cohorts have not spent enough time in the labour force for experience to influence the gender gap. Therefore, these data suggest that the gender gap among young adults is due to occupational segregation or possibly discrimination.

One consistent finding in these data is that employment experience has a smaller impact on earnings among women than among men. As discussed above, this difference does not contribute substantially to the gender gap in earnings since the effects of experience are low. In contrast labour market experience has strong effects on unemployment (LSAY Research Report No 7). This result suggests that women's employment experience is less valued than men's experience. Alternatively, it may indicate that employers place a higher value on shorter labour market experience for women than for men. Employers may be less impressed by a male who at the age of 28 with limited employment experience compared to a woman who at the same age has the same limited experience due to family commitments.

In the initial model of social background and demographic variables, socioeconomic background had a small effect on hourly earnings. A 10-unit difference in occupational status translated to an increase in hourly earnings by about 1 per cent. Higher returns were found for females in the 1965 cohort. Slightly attenuated effects were found after the addition of school variables since there is a relationship between the socioeconomic background of students and the type of school they attend. The addition of educational qualifications decreased its effects to statistical insignificance except among females in the 1965 and 1970 cohorts. Therefore, socioeconomic background does not generally have a direct effect on earnings net of qualifications and experience.

There were no net effects of non-English speaking background on hourly earnings. Initial analyses indicated that hourly wages of women in this group were slightly depressed in the first two cohorts. (The estimate for the 1965 cohort just failed to reach conventional levels of significance). However, the difference was not statistically significant with the addition of school variables. Persons from non-English speaking backgrounds score significantly lower on the reading comprehension tests (Marks & Ainley, 1997) so the difference in achievement probably accounts for their slightly lower earnings. It is important to note that this group includes respondents from a variety of backgrounds, who may differ widely in their hourly earnings. So this effect is an average effect for non-English speaking backgrounds and is net of the socioeconomic status of the family of origin.

The effect of living in a major metropolitan area while at school remained significant after the addition of educational qualifications and employment experience. To some extent this finding reflects lower wages outside the major metropolitan areas assuming that most respondents from non-metropolitan areas did not migrate to the cities when they entered the labour market. Further analyses would employ measures of the respondents' current address (preferably the address of the place of employment) in order to draw conclusions about the effect of location.

Results from this study confirm the importance of educational qualifications on earnings, although it was difficult to make conclusions about the 1970 cohort because of their limited time in the labour market. The qualification with the largest impact on earnings is a university degree. This finding confirms a fundamental assumption about the Higher Education Contribution Scheme, that degrees do contribute to higher earnings whereas other qualifications do not bring about sustained increases in earnings.

The returns to degrees found in this study are generally lower than those found in other studies. Gregory (1995) shows that for equivalent cohorts degree holders enjoy between 1.25 and 1.50 times the earnings of year 12 completers which are larger than the estimates presented here. This difference in magnitude possibly reflects the bias in the returns to degrees in the absence of controls for ability.

The increasing effect of degrees has also been noted in other studies. Gregory (1995) also notes that the gap between more and less educated workers widens with age. Comparisons of the mean weekly take home earnings also show higher returns for degrees holders (Long, McKenzie & Sturman, 1996).

This study confirms this earlier work which show that trade qualifications and technical certificates are not well rewarded in the Australian labour market (Dockery & Norris,

1996; Gregory, 1995). Our data show that apprenticeships initially leads to higher returns but not during the mid- and late twenties. Diplomas gained at a University or College of Advanced Education do provide higher hourly earnings especially for women.

The issue of the relationship between the overall unemployment rate and the wages of young people is a contentious one. Given the laws of supply and demand, very low youth wages should encourage employment whereas very high youth wages would make the employment of youths less economically viable. Disagreements centre on the strength of the relationship. If the relationship is very strong then there would be policy pressures to let the relative wages of youths fall. On the other hand, a weak relationship suggests that cutting youth wages will have no benefit on unemployment. These investigations have included the overall unemployment rate as an independent influence on hourly earnings. We found, not unexpectedly, that increases in the overall unemployment rate dampen hourly earnings. However, this does not mean that the converse is true.

This study has shown that the analyses of data from youth cohorts are of considerable value in examining influences on hourly earnings. It shows that early school achievement has a long-term effect on future earnings. It also shows the benefits of apprenticeships, year 12 completion and university or CAE diplomas on earnings during the early career. Degrees stand out as consistently increasing earnings relative to other qualifications. Furthermore, this study suggests a narrowing of the gender gap in youth earnings over time.

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APPENDIX 1: DATA AND ANALYSIS

Data

These analyses are based on data collected for the *Youth in Transition* project run by the *Australian Council for Education Research*. The four cohorts were born in 1961, 1965, 1970 and 1975. This study uses data from the older 3 cohorts. Each cohort had an initial sample size of over 5,000 respondents. The 1961 and 1965 cohorts were, respectively, the 14 and 10 year old samples who undertook literacy and numeracy tests in the 1975 *Australian Studies in School Performance*. The 1970 sample was the 10-year-old sample that sat similar tests in 1980 for the *Australian Study in Student Performance*. These cohorts were annually sent mail questionnaires, which collected information on their education, labour market, and family situations.[1] The 1975 cohort is not used in these analyses since at the time of writing, they were too young to make meaningful comparisons of earnings.

Measures

In each questionnaire respondents were asked their occupation, the hours they worked each week and their take home pay (after tax and other deductions). Several adjustments were made to the data. Respondents without a job or whose take home pay was missing or zero were excluded for the earnings equations for that year. Respondents for whom hours data was missing but who indicated they worked full- or part- time were assigned 35 and 20 hours worked per week respectively. Respondents who indicated they worked an excessive number of hours per week were reassigned the value 35 for hours worked. Therefore these analyses include both full- and part-time employees as well as the self-employed. Hourly earnings were calculated by dividing take home pay by hours worked. As is most common in analyses of income attainment, hourly earnings were converted to the log form and therefore can be conveniently interpreted as percentage effects.[2] Conversion to the log form also reduces the undesirable effects on parameter estimates caused by the high degree of skewness in earnings distributions.

Several dichotomous measures of educational qualifications were constructed. These measures were designed to capture the range of educational qualifications available to students in these cohorts. These are: year 12 completion, degree obtained at a University or CAE[3]; diploma obtained at a University or CAE, post-graduate diploma; TAFE[4] diploma, non-trade TAFE certificate, apprenticeship or trade certificate, certificate obtained at a University or CAE and other qualification obtained at a private institution.[5] These measures of educational qualifications used in these analyses made use of the longitudinal nature of the data. Respondents were coded as having a qualification if they had completed a qualification in the previous year. In general population samples, it is a reasonable assumption that qualifications were gained sometime prior to employment. However, in these youth cohorts there is a substantial amount of movement between study and employment so we needed to establish precisely the temporal sequence. For the 1961 and 1965 cohorts the qualification measures are identical to those used by Long, McKenzie & Sturman (1996). The same procedure was adopted to construct measures of educational qualifications for the 1970 cohort.

The mail questionnaires included a calendar where respondents indicated what they were doing for each month of a particular year. The non-exclusive categories were full-time work, part-time work, looking for work, home duties, full time study and part-time study. Information from the calendar was used to construct measures of labour force experience. The labour force experience measure employed in these analyses is the percentage of time a respondent spent in full-time employment of the time he or she participated in the study. This measure was developed for two reasons. First, it is difficult to define the precise time a respondent entered the labour market. Second, not insignificant numbers of respondents were out of the study for a year or longer but returned at a later date. Although part-time work also constitutes employment experience, information on part-time work was not used in the construction of the experience measure. This is, in part, because part-time work does not have the same career pathways as full-time work and conceptual and analytic problems with either combining part-time work with full-time or employing two labour force experience measures. Since our experience measures are based on a month by month record they are more accurate than the commonly used measures based on either age or recall data.

Gender was measured as a dichotomous variable with males scoring one and females zero. Age was calculated from birth year and centered at age 25. Respondents were defined as from a non-English speaking background if both parents were born in a non-English speaking country. A variable distinguishing respondents who lived in a major metropolitan area from other respondents was created.[6] Socioeconomic background was measured by parental occupational status (based usually on the father's job). It was constructed by assigning occupational status scores to occupation codes for a parent's present or previous job. Where father's job was missing, mother's job was used. Occupational status scores (ANU2) were derived from the average income and education of each occupation category in the census. National unemployment figures were obtained from the Australian Bureau of Statistics publications.[7] These were centered (at 6.2 per cent).

The achievement measure was constructed by combining scores for reading comprehension and numeracy. Since the tests differ in their level of difficulty, the achievement measures were standardised. Using a common measure of achievement developed from Rasch modelling for the two cohorts tested at age 14 only very marginally altered the magnitude of the coefficients.

Analytical Procedures

These analyses were performed on pooled data for all ages or for specific age ranges. After pooling the data with an identifier for each year of the survey, the data were analysed using a repeated measures design. There are several advantages with this approach. First, by combining the data for the whole cohort, we minimise fluctuations due to sampling and measurement error. Second, the effect of missing data is minimised by estimating random rather than fixed effects (Littell, Milliken, Stroup, & Wolfinger, 1996:115-134). Finally, this specification is most appropriate since the nature of the data is hierarchical with hourly earnings at the level 1 (the repeated measures) and individuals at level 2. And finally the repeated measures model specification provides more reliable estimates of population parameters and the associated statistical tests for both individual and group effects (Littell et al., 1996).

The effects presented in Tables A1 to A7 are direct effects, that is the effect of a particular factor on hourly earnings net of the other factors in the model. In the Figures they are presented as the percentage difference in earnings due to a particular factor. The direct effects displayed expect in Figure 3 which presents the total rather than direct effects of occupational background and achievement. The percentage differences are derived from the logistic regression coefficients presented in corresponding tables in Appendix 2. Note 2 shows the relationship between the logistic regression estimates and percentage effects. Effects that fail to reach conventional levels of statistical significance ($P<0.05$) are displayed as zero effects in the Figures.

In the case of categorical measures (male, non-English speaking background, major-metropolitan place of residence, year 12 completion and other qualifications) the effects are percentage differences in hourly earnings relative to the comparison group (female, English speaking background, not a major metropolitan place of residence, not completing year 12, and not possessing the particular qualification). In the case of continuous measures (parental occupational status, the overall unemployment rate, achievement and experience of full-time employment) the effects on hourly earnings correspond to a specific difference in the value of the factor. For occupational status the difference is 10 units on the occupational status measure; for unemployment rates the difference is a single percentage point; for achievement the difference is one standard deviation; and for employment experience the difference is 10 per cent in the time spent employed full-time.

APPENDIX 2: LOGISTIC ESTIMATES OF MAIN EFFECTS

Table A1 Effects on Hourly Earnings - Background Factors (Model 1)

	1961 Cohort			1965 Cohort			1970 Cohort		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	1.98***	2.11***	1.96***	2.45***	2.53***	2.47***	2.89***	2.98***	2.86***
Age (Centered at 25)	0.11***	0.11***	0.10***	0.12***	0.12***	0.12***	0.15***	0.15***	0.14***
Male	0.12***	-	-	0.10***	-	-	0.05***	-	-
Parental Occupational Status (x10)	0.009**	0.008**	0.010**	0.012**	0.004	0.020**	0.011**	0.009*	0.012**
Non-English Speaking Background	-0.04*	-0.03	-0.05*	0.00	0.04	-0.03†	-0.01	-0.02	0.01
Major-Metropolitan	0.05***	0.05***	0.05***	0.03***	0.05***	0.02†	0.03*	0.01	0.04**
Unemployment Rate for Year	-0.02***	-0.02***	-0.01*	-0.08***	-0.07***	-0.08***	-0.06***	-0.06***	-0.06***

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A2 Effects on Earnings - Background and School Factors (Model 2)

	1961 Cohort			1965 Cohort			1970 Cohort		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	2.04***	2.17***	2.06***	2.43***	2.52***	2.44***	2.86***	2.95***	2.83***
Age (Centered at 25)	0.08***	0.09***	0.07***	0.12***	0.12***	0.12***	0.14***	0.15***	0.14***
Male	0.14***	-	-	0.10***	-	-	0.06***	-	-
Parental Occupational Status (x10)	0.010**	0.010*	0.010*	0.009**	0.002	0.015**	0.006*	0.006	0.006†
Non-English Speaking Background	-0.03†	-0.03	-0.03	0.01	0.04	-0.03	0.01	-0.01	0.03
Major Metropolitan	0.08***	0.09***	0.06***	0.03**	0.04**	0.01	0.02	0.00	0.03*
Unemployment Rate for Year	-0.04***	-0.04***	-0.04***	-0.08***	-0.07***	-0.08***	-0.06***	-0.06***	-0.06***
Catholic School	0.01	0.00	0.01	0.02	-0.01	0.04**	0.03†	0.02	0.03†
Independent School	0.04*	0.03	0.05*	0.03†	0.00	0.07***	0.03	0.02	0.03
Achievement Test Score (Std.)	0.07***	0.05***	0.08***	0.03***	0.03**	0.03***	0.04***	0.05***	0.04***

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A3 Effects on Earnings - Background, School Factors and Qualifications (Model 3)

	1961 Cohort			1965 Cohort			1970 Cohort		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	2.00***	2.13***	2.00***	2.38***	2.48***	2.38***	2.75***	2.84***	2.72***
Age (Centered at 25)	0.08***	0.08***	0.07***	0.11***	0.11***	0.11***	0.13***	0.13***	0.13***
Male	0.14***	-	-	0.10***	-	-	0.05***	-	-
Parental Occupational Status (x10)	0.002	0.004	0.001	0.005*	0.001	0.009***	0.006*	0.006	0.006†
Non-English Speaking Background	-0.02	-0.02	-0.02	0.01	0.03	-0.01	0.02	0.01	0.03
Major Metropolitan	0.06***	0.07***	0.04*	0.02*	0.03*	0.00	0.02*	0.00	0.04**
Unemployment Rate for Year	-0.04***	-0.04***	-0.04***	-0.07***	-0.07***	-0.08***	-0.05***	-0.06***	-0.05***
Catholic School	-0.01	-0.01	-0.00	0.01	-0.01	0.02†	0.02	0.01	0.02
Independent School	0.01	-0.00	0.02	0.00	-0.01	0.03	-0.00	-0.01	-0.00
Achievement Test Score (Std.)	0.03***	0.03**	0.04***	0.01*	0.02*	0.01	0.04***	0.04***	0.03**
Completed Year 12	0.06***	0.04*	0.08***	0.04***	-0.01	0.07***	0.06***	0.05*	0.07***
Degree	0.18***	0.17***	0.19***	0.17***	0.19***	0.15***	0.03†	0.07*	0.01
Apprenticeship	0.07***	0.05**	0.12*	0.12***	0.10***	0.09†	0.15***	0.17***	0.05
Ph.D.	0.12*	0.19**	-0.14	-0.09	-0.07	-0.12	-	-	-
Other Qualification (Private)	0.05**	0.02	0.07***	0.05**	0.05	0.04**	-0.05*	-0.07	-0.04†
Certificate at CAE/University	0.06	-0.01	0.11†	-0.04	-0.09	0.01	0.07	0.07	0.08
Certificate at TAFE	0.00	0.03	-0.03	0.02†	0.06**	-0.01	-0.04**	-0.03	-0.05*
Post-Graduate Diploma	0.00	-0.03	0.03	0.05†	0.04	0.05†	0.10**	0.14†	0.09*
Diploma at CAE/University	0.09***	0.01	0.12***	0.08***	0.02	0.11***	0.11***	0.07	0.12***
Diploma at TAFE	-0.00	-0.03	0.02	-0.01	0.07†	-0.08*	0.02	0.00	0.03

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A4 Effects on Earnings - Background, School Factors, Qualifications and Labour Market Experience (Model 4)

	1961 Cohort			1965 Cohort			1970 Cohort		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	2.00***	2.13***	2.00***	2.37***	2.45***	2.38***	2.77**	2.84***	2.74***
Age (Centered at 25)	0.08***	0.08***	0.07***	0.11***	0.11***	0.11***	0.13**	0.13***	0.13***
Male	0.13***	-	-	0.10***	-	-	0.06**	-	-
Parental Occupational Status (x10)	0.003	0.004	0.002	0.006*	0.002	0.009***	0.005	0.006	0.005
Non-English Speaking Background	-0.02	-0.02	-0.02	0.01	0.04	-0.01	0.02	0.01	0.03
Major Metropolitan	0.05***	0.07***	0.03*	0.02*	0.04**	0.00	0.02*	0.00	0.04**
Unemployment Rate for Year	-0.04***	-0.04***	-0.04***	-0.07***	-0.07***	-0.08***	-0.05**	-0.06***	-0.05***
Catholic School	-0.01	-0.01	0.00	0.01	-0.01	0.02†	0.02	0.01	0.02
Independent School	0.01	-0.01	0.02	0.01	0.00	0.03	-0.01	-0.01	-0.01
Achievement Test Score (Std.)	0.03***	0.03**	0.04***	0.01†	0.02†	0.01	0.04**	0.04***	0.03**
Completed Year 12	0.06***	0.05**	0.08***	0.05***	0.02	0.08***	0.04**	0.04†	0.05*
Degree	0.20***	0.18***	0.21***	0.17***	0.20***	0.15***	0.03	0.07*	-0.00
Apprenticeship	0.06***	0.05**	0.11**	0.11***	0.10***	0.09†	0.15**	0.17***	0.07
Ph.D.	0.11*	0.19**	-0.15	-0.09	-0.06	-0.12	-	-	-
Other Qualification (Private)	0.05**	0.02	0.07***	0.04**	0.05	0.04**	-0.04*	-0.07	-0.04†
Certificate at CAE/University	0.05	-0.01	0.11†	-0.04	-0.09	0.01	0.07	0.07	0.08
Certificate at TAFE	-0.00	0.02	-0.03	0.02†	0.05**	-0.01	-0.04**	-0.03	-0.05*
Post-Graduate Diploma	0.00	-0.03	0.04	0.05†	0.05	0.05†	0.10*	0.14†	0.08†
Diploma at CAE/University	0.10***	0.02	0.14***	0.09***	0.03	0.11***	0.11**	0.07	0.12***
Diploma at TAFE	-0.01	-0.03	0.02	-0.01	0.07	-0.08*	0.01	0.00	0.02
Percent Time Full-Time Work (x10)	0.009***	0.003	0.010***	0.006***	0.010***	0.001	-0.005	-0.00	-0.009

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A5 Effects on Earnings of Educational Qualifications and Labour Market Experience at Three Age Groups (1961 Cohort)

	At Age 18-22			At Age 23-27			At Age 28-33		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	1.69***	1.71***	1.67***	1.97***	2.09***	1.95***	2.33***	2.50***	2.32***
Male	0.01	-	-	0.11***	-	-	0.15***	-	-
Achievement Test Score (Std.)	-0.01	-0.03	0.03	0.03***	0.02*	0.03**	0.04***	0.03*	0.04**
Completed Year 12	0.08**	0.10*	0.06†	0.03*	-0.00	0.07***	0.07***	0.07**	0.07***
Degree	0.11†	0.10	0.14*	0.21***	0.20***	0.21***	0.26***	0.26***	0.25***
Apprenticeship	0.16***	0.16**	0.19*	0.08***	0.07***	0.05	0.03	0.02	0.09
Ph.D.	-	-	-	0.22	0.25†	0.00	0.14**	0.19**	-0.02
Other Qualification (Private)	0.15*	0.22	0.14**	0.07***	0.06	0.08***	0.05*	-0.00	0.08**
Certificate at CAE/University	-0.19	-0.63**	0.10	0.07	0.04	0.11	-0.01	-0.01	0.03
Certificate at TAFE	0.00	0.01	0.02	0.02	0.08**	-0.05†	0.02	0.03	0.01
Post-Graduate Diploma	-	-	-	-0.02	0.01	-0.04	-0.01	-0.05	0.04
Diploma at CAE/University	0.06	-0.02	0.11†	0.15***	0.11**	0.15***	0.10***	0.00	0.15***
Diploma at TAFE	-0.02	0.15	0.01	0.05	0.06	0.05	0.02	-0.02	0.05
Percent Time Full-Time Work (x10)	-0.006	-0.007	-0.001	0.008***	0.010***	0.006*	0.012***	0.013**	0.012***

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A6 Effects on Earnings of Educational Qualifications and Labour Market Experience at Three Age Groups (1965 Cohort)

	At Age 18-22			At Age 23-27			At Age 28-33		
	All	Male	Female	All	Male	Female	All	Male	Female
Intercept	1.58***	1.68***	1.59***	2.24***	2.33***	2.24***	2.34***	2.43***	2.34***
Male	0.10***	-	-	0.11***	-	-	0.09***	-	-
Achievement Test Score (Std.)	-0.04***	-0.04**	-0.04**	0.05***	0.05***	0.05***	0.07***	0.07**	0.06**
Completed Year 12	0.20***	0.18***	0.21***	0.07***	0.08**	0.07***	0.06*	0.03	0.08**
Degree	0.41***	0.42***	0.40***	0.24***	0.26***	0.22***	0.26***	0.30***	0.24***
Apprenticeship	0.33***	0.32***	0.34**	0.11***	0.10**	0.11	0.10*	0.10†	-0.04
Ph.D.	-	-	-	0.06	0.09	0.01	-0.14	-0.13	-0.14
Other Qualification (Private)	0.18***	0.34***	0.15***	0.07***	0.05	0.08***	0.05	0.01	0.06†
Certificate at CAE/University	0.13†	0.14	0.14	-0.01	-0.01	-0.01	-0.13	-0.24†	0.00
Certificate at TAFE	0.16***	0.25***	0.09***	0.05**	0.06*	0.03	-0.01	0.01	-0.03
Post-Graduate Diploma	0.17***	0.23*	0.13*	0.01	-0.01	0.01	0.01	-0.03	0.04
Diploma at CAE/University	0.43***	0.42***	0.43***	0.12***	0.09†	0.14***	0.04	-0.02	0.07
Diploma at TAFE	0.17***	0.25**	0.11†	0.05	0.09†	-0.00	-0.01	0.05	-0.07
Percent Time Full-Time Work (x10)	0.027***	0.032**	0.022***	0.018***	0.025***	0.013***	0.020***	0.028**	0.014*

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.001

Table A7 Effects on Earnings of Educational Qualifications and Labour Market Experience at Two Age Groups (1970 Cohort)

	At age 18-22			At age 23-24		
	All	Male	Female	All	Male	Female
Intercept	1.99***	2.03***	1.98***	2.31***	2.33***	2.34***
Male	0.04**	-	-	0.06**	-	-
Achievement Test Score (Std.)	0.03***	0.03*	0.04**	0.02	0.03	-0.00
Completed Year 12	0.16***	0.18***	0.15***	0.06*	0.08†	0.06
Degree	0.29***	0.31***	0.28***	0.10***	0.16***	0.06†
Apprenticeship	0.25***	0.26***	0.19***	0.08*	0.13**	-0.07
Ph.D.	-	-	-	-	-	-
Other Qualification (Private)	0.06*	-0.00	0.08*	-0.02	-0.03	-0.03
Certificate at CAE/University	0.18*	0.18	0.18†	0.15†	0.21†	0.11
Certificate at TAFE	0.04*	0.06†	0.04	-0.06*	-0.02	-0.08*
Post-Graduate Diploma	0.13*	0.08	0.15*	0.03	-0.18	0.11
Diploma at CAE/University	0.29***	0.17†	0.33***	0.11*	0.12	0.09*
Diploma at TAFE	0.13*	0.09	0.16**	0.07	0.07	0.06
Percent Time Full-Time Work (x10)	0.024***	0.029***	0.021***	0.020***	0.024**	0.017**

Note. † 0.10<P<0.05; * 0.01<P<0.05; ** 0.001<P<0.01; *** P<0.00

NOTES

1 Subsequent data collection for the Youth in Transition project began in 1978 with the survey of a single national sample of 17-year-olds, more than 6000 persons who had been born in 1961. In 1981, 1985 and 1989 similarly sized samples from the 1965, 1970 and 1975 birth cohorts were added to the program. The annual surveys of these samples covered ages 17 to 33 years for the 1961 cohort (finished in 1994), 16 to 30 years for the sample born in 1965 (finished in 1995), 15 to 24 years for those born in 1970 (finished in 1994), and 14 to 21 years for the newest of the samples, those born in 1975. Data continues to be collected from this 1975 cohort. Gaps in the otherwise annual cycle of surveys, as in the case of the 1961 cohort in 1985 and 1988 indicate where resource constraints precluded a survey in that year. More details on the LSAY project can be obtained from the ACER internet site (www.acer.edu.au).

2 The estimates on logged income cannot be directly interpreted as percentage effects although they are close for small parameter estimates. The correct formula to convert logistic estimates to percentage effects is: Percentage effects = [exp(Estimate)-1]x100 (see Allison, 1995:65).

3 College of Advanced Education (CAE). These were upgraded to Universities during the late 1980s.

4 Technical and Further Education (TAFE).

5 Private institutions most often provide courses in secretarial, computer and business studies.

6 This measure was taken from when the students were at school. It is a crude measure since it assumes that most students in non-metropolitan areas did not try to obtain jobs in the capital cities. More sensitive measures can be constructed but fall outside the major aims of this report.

7 The publications are *Social Trends* and the Labour Force summary catalogues.

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